Chapter 5 – Research, Monitoring and Evaluation

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CHAPTER 5: TABLE OF CONTENTS

CHAPTER 5: TABLES

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5 Research, Monitoring and Evaluation

The following chapter includes a discussion of research, monitoring and evaluation needs; guidelines and protocols for sage-grouse population monitoring; guidelines and protocols for sage-grouse habitat evaluation and monitoring and; related adaptive management recommendations. Since this Plan is a living document, users should check the web site at http://fishandgame.idaho.gov/cms/hunt/grouse/ periodically for updates to protocols and other pertinent information.

5.1 Research, monitoring and evaluation needs

Although a great deal is known about sage-grouse ecology and habitat, additional research is needed in order to better understand the range of factors that affect sage-grouse populations, sage-grouse habitat, and the relationship between them. Research is also needed to identify better ways of addressing both population and habitat needs. Additional evaluation and monitoring activities are essential to recognizing and understanding population and habitat trends. Equally important, monitoring and evaluation are crucial to determining the effectiveness of conservation measures and, if appropriate, adjusting or otherwise changing those measures. For these reasons it is particularly important that monitoring and evaluation follow standardized and accepted procedures and protocols wherever they are available.

5.1.1 Summary of needs by threat category

The following section presents a summary of needed research, monitoring and evaluation relative to sage-grouse. Research, monitoring and evaluation needs were presented at the end of each set of conservation measures in Chapter 4 in order make clear the potential uncertainties associated with identifying conservation actions in some cases, to illustrate the limitations associated with conservation actions in other cases, and to underscore the importance of monitoring and evaluation in relationship to most conservation measures. However, they are presented again here as a consolidated unit, for the convenience of those using this document, and in particular, to facilitate planning and budgeting by the primary agencies who are likely to coordinate and fund research, monitoring and evaluation activities.

Research, monitoring and evaluation takes place at multiple spatial and temporal scales. Much, although not all, of the research, monitoring and evaluation needs

identified in the following discussion would occur at the mid- or fine-scale (e.g., SGPA or project scale).

5.1.1.1 Wildfire

- Identify and prioritize specific areas for habitat restoration and fuels modification (e.g., cheatgrass).
- Identify and prioritize areas bordering roads, railroads, farmlands or other areas where cheatgrass or other vegetation poses a high fire risk.
- Develop research methods to improve the establishment and survival of sagebrush seeding efforts.
- Expand efforts to improve the commercial supply of native grasses and forbs suitable for Idaho rangelands.

5.1.1.2 Infrastructure

- Research and monitoring of the effects of wind energy development in sage-grouse habitats with respect to sage-grouse survival, habitat-use and behavior including: abandonment of leks, nesting, brood rearing or winter habitat and the distance from the wind turbines that effects are experienced.
- Of additional interest are the effects of low frequency noise, shadow flicker, presence of tall structures etc.
- Map and quantify secondary and other roads (e.g., paved county, gravel, two-tracks), smaller power distribution lines (<138 kv), telephone lines in SGPAs. Identify specific potential problem areas.
- Identify utility, railroad, road rights of way where invasive plants increase fire risk.
- Research or model the synergistic effects of multiple infrastructure features on sage-grouse survival, habitat use, and behavior.
- Document the incidence and extent of avian predation on sage-grouse nest success, juvenile and adult survival in areas with extensive infrastructure and areas without extensive infrastructure.

- Evaluate sage-grouse response to new and existing power lines as associated with habitat conditions and avian predator densities.

5.1.1.3 Annual Grassland

- Cooperate with the Great Basin Restoration Initiative research projects. This need is also closely linked with research needs associated with climate change.

- Develop a consistent approach for monitoring, evaluating and reporting restoration efforts.

5.1.1.4 Livestock impacts

- Identify the impacts of livestock management (systems and individual practices) on sage-grouse populations, and habitat.

- Monitoring and evaluation is also necessary to better identify and determine the impacts of current grazing management practices on sage-grouse populations, and habitat.

- Document the extent of sage-grouse collision with fences and conduct effectiveness monitoring of flagged or tagged fences.

5.1.1.5 Human disturbance

- Evaluation is needed to document areas where general recreation, and especially, OHV activity may be causing unacceptable disturbances to leks or damage to important seasonal habitats and to aid in the planning or zoning of trails and closure restrictions. Coordination with the Rangewide Conservation Strategy team in developing or refining suggested disturbance buffers is recommended.

- Identify and map areas where potential conflicts may be occurring with human activities related to sheep bedding and leks.

5.1.1.6 West Nile Virus

- Continued testing for immunity.
- Research and testing of potential conservation measures.

5.1.1.7 Prescribed Fire (and sagebrush control)

- Develop a more effective and consistent approach to periodic mapping and classification of sagebrush habitats and cover classes using remote imagery.
- Research sage-grouse response to prescribed fire in the Mountain Big Sagebrush ecosystem.

5.1.1.8 Seeded perennial grassland

- Cooperate with the Great Basin Restoration Initiative research projects.
- Develop a consistent approach for monitoring, evaluating and reporting restoration efforts.

5.1.1.9 Climate change

- Define the capability of ecosystems and vegetation communities to withstand stress and/or disturbance and maintain capability of full recovery.
- Develop high quality, consistent, and accessible soil and vegetation data and models that describe how changes occur in response to stress and disturbance.
- Develop a system that identifies the effects of global change in the very early stages and identifies appropriate management responses.
- Develop new concepts of landscape scale management of rangelands to provide for adaptive management in response to climate change.
- Develop monitoring systems that track and predict how changes in land use and cover affect ecosystem function across spatial scales on rangelands.

- Acquire quantitative knowledge of ecological thresholds, indicators of change, and key decision points in the framework of comprehensive monitoring systems.

- Improve the commercial availability and supply of native grasses and forbs suitable for restoration in arid and semi-arid environments.

5.1.1.10 Conifer encroachment

- Document and refine our understanding of how the reduction of conifer encroachment affects sage grouse populations or lek attendance.

5.1.1.11 Isolated populations

- Develop a more effective approach to determine sage-grouse populations in isolated areas.

5.1.1.12 Predation

- Research, monitoring and evaluation activities to investigate: the behavior of predator species, the intra- and inter-specific relationships of predator populations, the impact of predators and other mortality factors on specific sage-grouse populations of concern, and on sex/age classes.

- Develop better methodologies to assist in identification of predator species linked to sage-grouse predation.

- Determine the factors that affect habitat quality as it relates to the level of predation.

- Determine the effect of habitat fragmentation as it relates to the level of predation.

- Experimentally implement and evaluate predator control measures in areas where predation is suspected to be limiting sage-grouse, to gain a greater understanding of the effects of this management approach on sage-grouse, specific predators, and the relationship between predator species.

5.1.1.13 Urban/exurban development

- Identify parcels of private land suitable as sage-grouse habitat or other sagebrush habitat values that are susceptible to loss to development or uses related to new developments

5.1.1.14 Sagebrush control

- See discussion in prescribed fire Section 5.1.1.7.

5.1.1.15 Insecticides

- Document mortalities of sage-grouse resulting from pesticide-use to improve our understanding of the extent of this threat.
- Monitor the impacts of Mormon cricket and rangeland grasshopper control efforts on sage-grouse food (insect) availability in control versus treatment areas.
- Monitor the effects of Mormon cricket and rangeland grasshopper control with respect to herbaceous and shrub cover in treated and untreated areas.

5.1.1.16 Agricultural expansion

- Sagebrush communities and potential restoration areas that are susceptible to agricultural development should be identified for potential land exchange, conservation easements or related actions.
- Document and report sagebrush acreage converted to agriculture at periodic intervals (to be determined) by county.

5.1.1.17 Sport hunting

- Identify all sage-grouse sub-populations to better understand the potential impacts of hunting.
- Conduct monitoring activities to refine our understanding of harvest effects on populations, age, and sex-classes.

- Monitor impact of spring hunting on leks.

5.1.1.18 Mines, landfills, and gravel pits

- Improve upon and standardize disturbance buffers.
- Monitor the effectiveness of recommended disturbance buffers.

5.1.1.19 Falconry

- See hunting Section 5.1.1.17.

5.1.2 Data gaps identified by U.S. Fish and Wildlife Service

In the discussion of the factors contributing to the greater sage-grouse not warranted Finding, participants in the USFWS structured range-wide science panel identified a number of data gaps that if resolved, could reduce uncertainty in their assessment of the likelihood of extinction within a certain time frame or even change their estimates (USDI-FWS 2005).

This information is included in this Plan because it provides an important window into some of the uncertainties and research, monitoring and evaluation needs that exist at the broad-scale (e.g., state or range-wide) and that might factor into future decisions regarding potential listing of the species.

The areas of uncertainty identified by the USFWS experts included:

- Systematic (e.g., species, subspecies) relationships among various grouse species;
- Underlying mechanisms by which sage-grouse populations respond to habitat changes;
- How to scale grouse habitat preference up to the level at which federal land is managed;
- Lack of studies across the range limits inferences;

- Effects of invasive plants;
- Application of grazing techniques to favor sagebrush habitat;
- Underutilization of the case study approach for sage-grouse management;
- Future gas and oil development impacts;
- Future advances in horticulture and fire suppression;
- The role of crested wheatgrass in sagebrush management; and
- The effectiveness of USDA Conservation Reserve Program or other easement and incentive programs.

5.2 Sage-grouse population monitoring

5.2.1 Monitoring breeding populations

Sage-grouse gather on traditional display areas called leks each spring that allow wildlife managers to track breeding populations by counting males associated with these leks. However, lek locations must be documented before a monitoring program is developed. A recent report on sage-grouse habitat and population monitoring (Connelly et al. 2003*b*) provides information on locating leks from the air and ground. Much of the sage-grouse habitat in southern Idaho has been searched for leks over the past 10-15 years. The identification of lek locations should be an ongoing task because some areas may develop breeding habitat (e.g., recovery of a burned area) and other areas may be altered by vegetative manipulation (e.g., sagebrush control projects or a change in grazing) or construction of various structures (e.g., power lines, wind turbines).

Lek counts have been widely used in Idaho and other western states to track sage-grouse breeding populations. Male sage-grouse are counted on 1 or more leks in a particular area using accepted protocols (see below). However, leks may be widely separated and such counts are not used to assess a single breeding population. Changes in lek attendance may be due to birds moving to other leks (fire) or disturbance (golden eagle, sheep camp, etc.) rather than an actual change in population. Unless all leks are counted in a given area, there is no means of assessing the cause of the change in lek attendance, and the lek count technique may produce erroneous results. Lek counts do serve another purpose, however, in that they provide

important information to land managers as to the presence of occupied or unoccupied leks, regardless of value for trend analysis.

To overcome some of the problems associated with a lek count, a group of leks that are relatively close and represent part or all of a single breeding population are counted together (Connelly et al. 2003*b*) to monitor trend. This approach, termed a lek route, facilitates repetition by different observers, increases the likelihood of recording new or satellite leks, and helps to account for birds moving to other nearby leks (Connelly et al. 2003*b*). Lek routes should be established so that all leks along the route can be counted within 1.5 hours.

Due to funding and manpower limitations, sampling intensity (e.g., the number of lek routes that should be run in a given year in a given area) will vary across the state. The minimum number of lek routes run in a planning area will vary depending on size of the area and accessibility. Of the 13 planning areas currently identified, two (15%) have no lek routes while one planning area has 13 (Table 5-1). A suggested minimum number of primary lek routes for each planning unit and an overall sampling strategy are provided in Table 5-1. Final lek monitoring goals will be determined by IDFG Regions by December 31, 2006. Generally, lek routes should be well distributed throughout a planning unit and should sample all or most major known breeding populations. Secondary routes should be used to support and enhance data on breeding populations, or track changes in habitats that are being rehabilitated. Secondary routes should be run a minimum of every four years. This approach should stabilize annual workloads of management biologists while still maintaining a quality database.

Table 5-1 Minimum number of lek routes suggested for each planning unit and an overall sampling strategy for monitoring breeding populations.

Planning unit	Current number of routes	Minimum number of primary routes suggested	Potential secondary routes
Big Desert	5[1]	5	3
Challis	5	4	1
Curlew	2	2	0
East Idaho Uplands	0	2	0
East Magic Valley	4	2	2
Jarbidge	1	1	0
Mountain Home	0	1	0
Owyhee	5[2]	6	3
Shoshone Basin	1	1	0
South Magic Valley	1	2	0
Upper Snake	13	8	5
West Central	4	1	3
West Magic Valley	3	2	1
Total	44	37	18

For effective and consistent monitoring of sage-grouse breeding population trends in Idaho, IDFG has adopted a standardized methodology for conducting lek routes, summarized below. This protocol will be employed by all individuals including professional wildlife biologists, technicians, volunteers, or others assisting with population monitoring. Document lek survey data, as appropriate, on the standardized forms provided in Appendix I. The "Sage-grouse Lek Survey" form is recommended for use in documenting new leks, or for monitoring individual leks not associated with an established lek route. The "Lek Route Survey" form should be used when running lek routes.

[1] Two routes (INL and Tractor Flats) represent Big Desert populations but are presently included in the Upper Snake SGPA totals.

[2] At least two routes appear to be lek counts. These could be continued as secondary routes but should not be included as lek routes.

5.2.1.1 General instructions for conducting a lek route

1. All new lek route participants must take lek route training available at IDFG regional offices.

2. Run each route four times per spring (four replicates for each route). This will ensure that peak male attendance is encountered at some point during the 4 route replicates.

3. All leks along a route during a particular replicate must be censused on the same morning.

4. Run each lek route from ½ hour before sunrise to one hour after sunrise.

5. All four route replicates should be run by the same observer.

6. Space route replicates roughly ten days apart.

7. Begin March 25 and run through April 30 for low elevation areas.

8. Begin April 5 and run through May 10 for high elevation areas.

9. Conduct lek routes only during good weather. Clear to partly cloudy, winds <10 knots (<12 mi) per hour).

10. Drive <25 mph along route between leks.

11. Count all males observed along the lek route and all males and females at a particular lek.

12. If weather conditions deteriorate outside the accepted parameters during the running of a lek route, the route should nonetheless be completed that day if possible, but subsequently run again in its entirety under acceptable weather conditions. While data from the initial attempt would not be useable for trend monitoring purposes, they may nonetheless be of some value in documenting occupancy of certain leks, especially if for some reason the route cannot be re-run that year.

13. Submit completed lek route forms to the appropriate regional IDFG contact by June 1 of each year.

5.2.1.2 Instructions for monitoring a specific lek

1. Locate a spot that provides good visibility of the entire lek. Two or three observation points may be necessary for a large lek.

2. If a lek does not appear to be occupied, turn off the engine, step out of the vehicle and listen for displaying birds.

3. Record the time the count begins and ends as well as other pertinent information on the standardized form (observer name, lek name/number, weather conditions, etc.). Do not record data on scrap paper or non-standardized forms. This will ensure that all participants consistently account for all necessary information.

4. First, count birds from right to left, wait 1-2 minutes. Second, count birds from left to right, wait 1-2 minutes. Finally, count birds from right to left again.

5. Record the highest number of males and females separately. If no birds are present, it is very important that you record a zero. Do not leave a space blank.

6. Proceed to the next lek and repeat steps 1-5. Watch carefully for new leks. If new leks are encountered along the way, stop and do a count following steps 1-5. Make a note on the form regarding the new lek.

7. Obtain GPS positions of all lek locations if this has not been done previously. Obtain a new GPS position if a lek moves greater than 0.25 mile.

8. If a new lek has been discovered, be certain to coordinate with the appropriate IDFG wildlife manager or data steward in assigning the appropriate lek identification number to the new lek.

5.2.1.3 Breeding population data administration

The Idaho sage-grouse lek database will be maintained by the IDFG Conservation Data Center. Data will be made available to cooperating agency biologists and LWGs.

5.2.2 Production monitoring

Currently, the only practical way to monitor sage-grouse chick production is by classifying wings from hunter-harvested birds. The wing from a sage-grouse can provide information on the age (juvenile, yearling, or adult), gender, and reproductive status (for yearling and adult females successful or unsuccessful at nesting). Wings are collected at hunter check stations and from wing barrels distributed throughout southern Idaho. In late fall or early winter, the wings are classified by IDFG biologists and other trained volunteers during annual "wing bees". Future wing bees will provide opportunities for participation by members of LWGs. Data collected during the wing bees is recorded by harvest unit, however, data can also be grouped by Sage-grouse Planning Areas.

5.2.3 Harvest monitoring

An annual telephone survey of sage-grouse hunters will be used to estimate harvest, number of hunters, effort, and birds per hunter. Check stations will be used to monitor hunter success (birds per hunter and hours per bird) and trends in hunting pressure. Regional IDFG personnel will advise LWGs of planned sage-grouse check stations and participation by LWG members will be encouraged. Additionally, wing barrels will provide an index to harvest although their primary purpose is to increase samples of wings for estimating production.

5.2.4 The future of population monitoring

Idaho and other sage-grouse states currently monitor sage-grouse populations in a generally standardized manner within state boundaries. However, the aggregation and analysis of population data at scales encompassing multiple states has been problematic, due to differing protocols or standards for data collection. In an effort to resolve this issue, sage-grouse biologists and statisticians convened in Pocatello, Idaho, May 17-18, 2005 to explore options to improving methodologies for use at broader scale. In general, participants agreed there is a compelling need for standardization of population monitoring protocols and standards rangewide, and a need for a hierarchical sampling approach that would facilitate the inference of population status and trends across geographic areas and multiple scales. Idaho sage-grouse researchers are at the forefront of this important issue, as new approaches to monitoring populations and managing data are developed, Idaho's existing monitoring protocols will be modified as appropriate.

The National Wildlife Federation in Montana has developed an "Adopt-a-Lek" Program to encourage private landowners, sportsmen and others to assist agencies in monitoring leks. IDFG will explore this concept and develop a recommendation by December 31, 2006.

5.2.5 Summary of SGPA population monitoring goals

Following is a summary of suggested population monitoring goals by SGPA, based on the current status of routes, knowledge of data gaps and local conditions.

5.2.5.1 Big Desert SGPA

- Continue to monitor existing lek routes.
- Periodically check for activity along 2 historical routes.

5.2.5.2 Challis SGPA

- Continue to monitor as many leks as possible in the Lemhi and Pahsimeroi drainages. Expand efforts in other areas throughout the planning area (Challis, Morgan and Ellis Creek) through ground counts and aerial surveys.
- Multiple years of aerial surveys may need to be conducted to determine lek activity (especially in high snow years).

5.2.5.3 Curlew SGPA

- Maintain lek route counts and increase monitoring efforts through aerial surveys and ground counts.
- Work with private landowners to obtain access to private lands, to enhance lek survey and monitoring efforts.

5.2.5.4 East Idaho Uplands SGPA

- Increase efforts to identify active leks in Caribou, Bingham, and Power (Deep Creek Mountains) Counties through ground counts and aerial surveys.

- Develop lek routes or trend counts to identify changes in activity.

5.2.5.5 East Magic Valley SGPA

- Continue monitoring current lek routes for long-term trends.

5.2.5.6 Jarbidge SGPA

- Maintain lek route counts and increase monitoring efforts in the Inside Desert and Grassy Hills area through aerial surveys and ground counts.

5.2.5.7 Mountain Home SGPA

- Increase lek counts through ground counts and aerial surveys.

5.2.5.8 Owyhee SGPA

- Continue to increase monitoring efforts through aerial surveys and ground counts.
- Develop additional methods to count leks in isolated areas such as infrared sensing.

5.2.5.9 Shoshone Basin SGPA

- Continue to monitor all leks along the lek route for changes in population trends.

5.2.5.10 South Magic Valley SGPA

- Increase efforts to identify active leks through ground counts and aerial surveys, and create new lek routes or trend counts on individual leks.

5.2.5.11 Upper Snake SGPA

- Continue to monitor lek routes for long-term trends, modify routes counted to maximize efficiency (if there are some routes that cannot be counted annually due to lack of personnel, consider counting every 5 years to determine activity). Expand efforts in the Upper Big Lost drainage.

5.2.5.12 West Central SGPA

- Maintain or increase current monitoring efforts through ground counts and aerial surveys.
- Need to work closely with private landowners to obtain access on private lands, to enhance lek survey and monitoring efforts.

5.2.5.13 West Magic Valley SGPA

- Continue to conduct lek route counts to identify changes in population trends.

5.3 Sage-grouse habitat evaluation and monitoring

The evaluation and monitoring of sage-grouse habitats and selected threats are crucial components in the implementation of this Plan. Standardized approaches for the collection and aggregation of spatial and tabular data across multiple scales are presented in this chapter along with specific tasks, timelines, and responsible parties. In some cases processes or protocols still need to be developed; in these cases suggested tasks and timelines are identified to facilitate further action.

The general approach presented in this chapter is to address monitoring needs and tasks first at the broad-scale (e.g., state of Idaho; 1:500,000 scale) and mid-scale (e.g., Sage-grouse Planning Area; 1:100,000 scale), followed by fine-scale (e.g., watershed, specific habitat restoration project; 1:24,000 USGS quad scale). In general, tasks related to data acquisition and management for broad and mid-scales will be accomplished at the state-office level, and tasks at the fine scale will be the responsibility of land-management agency field offices and the IDFG Regional-level offices. Private landowners who wish to contribute information are encouraged to work closely with their respective IDFG Region and/or NRCS offices. Because of the hierarchical, multi-scale nature of habitat data, it is essential for agency field and

state office level entities to coordinate closely. More specific discussion and details are provided in the following sections.

5.3.1 Broad- and mid-scale monitoring

5.3.1.1 Idaho sage-grouse habitat planning map

The monitoring of trends in acreage of Key Habitat, Perennial Grasslands, Annual Grasslands and Conifer Encroachment Areas at the mid- and broad scales is crucial in determining progress toward meeting the goals and objectives in the Idaho Sage-grouse Conservation Plan. To that end, the Idaho Sage-grouse Habitat Planning Map will be updated annually, based on the past year's wildfire, habitat restoration, sagebrush/fuels management and related activities occurring on federal, state and private (volunteer landowner) lands. Updates will be disseminated and/or made available to Local Working Groups (LWGs) and partners. In addition, non-sensitive data will be made available to the public through the Internet. See Section 5.3.4.2 for additional discussion. As mapping technology and the resolution and accuracy of digital map products improve, they will be considered for use in refining or replacing the habitat planning map.

The Sage-grouse Advisory Committee (SAC) will establish a SAC Technical Assistance Team (TAT) by August 31, 2006, to facilitate the characterization, tracking and reporting of general status and trends in sage-grouse habitat characteristics and populations statewide. The SAC- TAT will include representatives from the Bureau of Land Management, U.S. Forest Service, Idaho Department of Fish and Game, Idaho Department of Lands, Idaho Department of Agriculture, and NRCS. Tasks assigned to the SAC TAT will include:

- Develop and disseminate a template for LWG annual accomplishment reports by October 31, 2006. Establish a database and/or spreadsheet to summarize habitat accomplishments from LWG annual reports, and habitat accomplishments from other agency and private projects by December 31, 2006. Also develop a format for producing a summary suitable for a statewide progress report.

- Serve as an information conduit between LWGs, SAC, and agencies, to provide habitat and population data as needed, and to ensure that information needed for annual updates to the Sage-grouse Habitat Planning Map and related reports is acquired in a timely manner. Note: site-specific fine-scale data will be maintained by the individual agencies.

- Review adequacy of 2005 USGS Shrubmap or other vegetation map products, by December 31, 2007 to help refine or replace the Sage-grouse Habitat Planning Map.

5.3.1.2 Habitat fragmentation monitoring

Graphics of selected habitat fragmentation metrics are illustrated in Chapter 3. These products were generated via GIS and FRAGSTATS (a computer program for analyzing fragmentation), based on the 2005 USGS Shrubmap digital landcover dataset and reflect conditions during approximately 1999-2003. As partnerships are developed and/or as new, updated imagery becomes available (e.g., approximately every 5-10 years), the status and/or trends in habitat fragmentation will be re-evaluated or refined.

- SAC-TAT will coordinate with USGS, Universities and other appropriate partners in further evaluating landscape and habitat fragmentation at multiple scales. Since technology and analytical approaches are anticipated to change, and since approaches to quantifying or modeling fragmentation vary depending on the metric, specific methods or software are not prescribed here.

5.3.1.3 Infrastructure monitoring

Baseline infrastructure, maps and statistics for major paved roads (state, federal, interstate), major power lines (>138 kv), active railroads, oil/gas pipelines, communications towers, and wind energy development/monitoring sites, by SGPA, have been incorporated into Chapter 4 using data available as of late 2004. Infrastructure metrics, including linear distance (miles), linear density (e.g., feet/acre), acres of buffer, and percentage of SGPA potentially influenced by buffers have been calculated for each SGPA but periodic updates will be necessary due to anticipated increases of these features on the landscape. Infrastructure data compiled at the local level will be aggregated to the broad- and mid-scale as needed (see Section 5.3.3 for additional discussion).

5.3.2 Fine-scale monitoring

5.3.2.1 Monitoring sage-grouse habitat characteristics

The monitoring of the status and trend of resource conditions and sage-grouse habitat characteristics at the fine-scale is particularly important since many aspects of

habitat-selection by grouse occur at this scale (e.g., nest site selection), and many land-use decisions and habitat effects also occur at the fine-scale. Fine-scale data can also be valuable in helping summarize our knowledge of conditions across broader landscapes, and is essential for accurately describing seasonal habitats.

There currently is no universally adopted methodology or process in place for evaluating and monitoring habitat characteristics across agency jurisdictional boundaries. While some land-management agencies (BLM, USFS, IDL, IDFG-Wildlife Management Areas) have varying protocols or partnering capabilities in place, the resulting data are not readily comparable or consistently available. Moreover, in many cases, existing data are not readily accessible for broader-scale applications or reporting. The standardization of field data collection protocols and/or the establishment of a centralized data storage system would facilitate analyses and foster closer coordination.

A national interagency group, the Sage-grouse Habitat Assessment Framework Technical Working Group, has been formed to develop a standardized approach for measuring greater sage-grouse habitat characteristics. Until this or a similar standardized approach for assessing habitats across jurisdictional boundaries has been adopted:

- Land management agencies will use existing habitat evaluation approaches, subject to modification as deemed appropriate by the respective agencies; and

- Other partners are encouraged to use Monitoring of Greater Sage-grouse Habitats and Populations (Connelly et al. 2003*b,* see Appendix H).

Regardless of the specific method used to collect habitat data, when interpreting the data, other information such as evaluations of rangeland health, long-term vegetation trend monitoring data, soil and ecological site information, aerial photographs, satellite imagery, and local knowledge of land management practices, should also be taken into consideration, to the extent such information is pertinent and available. It is also important that the interpretation of habitat data be made in the context of historic and recent disturbance events and recent weather patterns, such as drought or wet-cycles. For example, grass and forb cover can increase or decrease measurably depending on seasonal moisture conditions, irrespective of current management.

The following sections and accompanying tables describe sage-grouse habitat preferences based on research rangewide. It is important to note that the vegetative preferences described, such as height and canopy coverage, are likely to occur as different-sized patches in sagebrush/grassland communities. Specific measurements, such as grass canopy height at nest sites, do not imply a uniform landscape-wide measurement, but instead are a microsite measurement of vegetation at a specific site.

For instance, within a functional sagebrush community, under average growing conditions, the mosaic of varying vegetative characteristics should provide for many potential nesting sites across the landscape. If not, nesting cover could be a limiting factor, which may show up in the form of lower rates of nest success (Connelly et al. 2000*b*). Also, in some parts of Idaho, vegetation may not be capable of achieving the desired height or cover characteristics. Connelly et al. (2000*b*) suggested, "…in all these cases, local biologists and range ecologists should develop height and cover requirements that are reasonable and ecologically defensible."

In describing these general habitat characteristics, the intention is to identify habitat needs of sage-grouse and to help managers determine possible limiting factors associated with sagebrush communities. Sage-grouse do not use their habitat randomly, but select habitat based on their needs at a particular time. Similarly, the habitat descriptors that follow cannot be applied randomly. Their application requires discretion and must recognize the natural patchwork of variability that exists in a functional sagebrush community and the potential of the site to produce and maintain wood shrub and herbaceous cover.

5.3.2.2 General sage-grouse habitat use periods

Table 5-2: Generalized habitat use periods and descriptions (see Table 5-3 for fine-scale habitat descriptions)[3]

Habitats	General use period [a]	General description [b]
Breeding	March 1 - June 30	Variety of sagebrush communities in close proximity to big sagebrush communities
Leks	March 1 - May 15	Open areas near sagebrush where males traditionally display and breeding occurs.
Nesting	April 1 - June 15	Primarily big sagebrush communities, 15-25% canopy cover in close proximity to leks. Also includes habitat for pre-laying hens.
Early brood-rearing	From hatch - June 30	Sagebrush communities including low sagebrush in proximity of nest sites.
Summer - Late brood-rearing	July 1 - August 31	Variety of mesic or moist habitats in close proximity to sagebrush communities.
Fall	Sept 1 - Nov 30	Shift from summer habitats to winter habitats with timing variable.
Winter	Dec 1 - Feb 28	Variety of sagebrush communities that have sagebrush exposed over the snow.

5.3.2.2.1 Breeding habitat

The breeding period spans a very important time frame for sage-grouse, from lek attendance, through early brood-rearing. During this period, the hen and chicks are dependent on cover and food that sagebrush communities provide. Generalized habitat indicators for breeding habitat are summarized in Table 5-2.

In many areas, cover and food requirements during this critical period are provided by large expanses of mostly big sagebrush communities. However, in other areas, community mosaics of big and low sagebrush together provide the important life requisites. Often, inclusions or fingers of big sagebrush or other tall-statured sagebrush species (e.g., *A. tripartita*) provide the structure for protective nesting

[3] Information in this table was compiled from Connelly et al. 2000*b*; Connelly et al. 2004; and J. Connelly personal communication October 2004.

[a] Use periods may vary based on elevation, location, and annual weather conditions.

[b] General descriptions are for Idaho statewide; primary vegetation communities may vary based on local conditions and availability.

cover, while the more extensive adjacent low sagebrush communities provide an abundance of forbs and insects.

Average distances between nests and the nearest leks vary from 1.1 to 6.2 km (0.68 to 3.85 miles) (Autenrieth 1981, Wakkinen et al. 1992, Fischer 1994, Hanf et al. 1994, Lyon 2000 cited in Connelly et al. 2000*b*). The distribution of nest sites in relation to leks can vary considerably, complicating efforts to map breeding habitat, and depends on whether populations are migratory or non-migratory, the habitat quality, and whether habitats are continuous or fragmented. Most sage-grouse populations in Idaho are thought to be migratory (Idaho Sage-grouse Science Panel discussion, February 1-2, 2005). For those migratory populations, leks generally are associated with nesting habitats, however, migratory grouse may move more than 18 km (11 miles) from leks to nest sites (Connelly et al. 2000*b*).

Mapping procedure: To provide some level of consistency in approach to initially delineating breeding habitat, use of the following sequential mapping process is suggested (adopted from information provided in Connelly et al. 2000*b*), unless breeding habitat has already been identified locally through research, monitoring of radioed hens or other means. The suggested mapping procedure should also be useful in establishing a baseline for the analysis of the cumulative effects of disturbances (e.g., wildfire), and completed/planned vegetation management projects within SGPAs or other geographic areas. It is important to note that while the term "radius" is used in the mapping protocol, the intent is not to imply that all breeding habitats occur uniformly within a circle around specific leks or that the circle would delineate a rigid boundary. Rather the intent of this approach is to provide a methodology that can be easily used via routine GIS procedures to initially describe a polygon within which breeding habitat likely occurs. By describing "circles" around occupied leks, the resulting irregular polygon, created by overlapping circles (since many leks occur in proximity to each other) should include most of the potential breeding habitat, and thereby provide an area within which further analyses can be completed. Common sense and local site-specific knowledge of habitat conditions, directional movements of sage-grouse, and other factors are important complements to effectively utilizing this methodology.

> *Step 1 purpose: Identify the initial broad analysis area for the sage-grouse "population" of interest.*

Step 1. Select the desired landscape of interest, such as SGPA, appropriate Hydrologic Unit(s) (i.e., HUC), agency administrative unit, or other appropriate geographic area.

Step 2 purpose: Identify the area within which breeding habitat most likely occurs.

Step 2. Acquire the most recent IDFG sage-grouse lek coverage. Using a Geographic Information System (GIS), show all leks. Buffer each occupied lek with the appropriate distance (3.2 km, 5 km, or 18 km radius), depending on the migratory status of the sage-grouse population. (An occupied lek is defined as a lek where at least two or more male sage-grouse have attended in two or more of the previous five years.) This exercise will refine the initial breeding habitat analysis area determined in Step 1, in relation to leks. At this point, it is assumed that, for the population in question, most breeding, nesting and early brood rearing activity will occur in sagebrush communities within this defined area.

Step 3 purpose: Identify areas within the analysis area that have generally suitable sagebrush cover for breeding habitat.

Step 3. Using available vegetation maps, query for sagebrush areas within the analysis area described in Step 2. Ideally, identify areas of 15-25% sagebrush canopy cover. In the absence of recent field-level or other more accurate vegetation maps, it is recommended that the 2005 USGS Shrubmap landcover dataset (http://sagemap.wr.usgs.gov/) be used in the interim, to provide consistency statewide, until such time as Shrubmap is updated, refined or replaced. Sagebrush polygons in Shrubmap reflect areas approximately 10% total shrub cover or greater, with sagebrush being dominant. It may also be useful at this point to combine areas of big sagebrush subspecies and areas of low/black subspecies separately.

Step 4 purpose: Refine the map described in Step 3, based on herbaceous understory conditions.

Step 4. Separately identify areas within the suitable (15-25% canopy cover) sagebrush communities that provide suitable or unsuitable herbaceous understory conditions. This will necessitate additional field-level mapping/verification or use of recent vegetation maps. Areas determined to provide suitable breeding habitat in terms of both sagebrush cover and understory structure and composition should be exempt from vegetation manipulations in most cases. Areas determined to be unsuitable or marginal breeding habitat, based on understory conditions, should be considered for habitat improvement efforts or other management actions, depending on local needs and scale.

Step 5 purpose: Identify areas of marginal (less than 15%) or high (greater than 25%) sagebrush cover within the analysis area.

Step 5. The use of National Agriculture Imagery Program (NAIP) data, aerial photographs, field-level maps or similar products will be necessary, until such time as the resolution of satellite imagery is refined. Areas with marginal sagebrush cover are anticipated to provide suitable breeding habitat sagebrush cover in the future. Areas with sagebrush cover exceeding 25% may warrant consideration for vegetation management actions, depending on local conditions, objectives, and scale.

Step 6 purpose: Identify or refine potential restoration areas within the analysis area.

Step 6. Query for annual grassland, perennial grassland, and conifer encroachment areas. Although the Idaho Sage-grouse habitat Planning Map identifies these areas on a coarse scale, doing so with more refined digital imagery (e.g., 2005 USGS Shrubmap, NAIP, or similar products), or field-level mapping is recommended. In general, when planning and prioritizing areas for sage-grouse breeding habitat improvement or restoration, exclude sites that, due to topographic or other factors, are of questionable value or that place sage-grouse at further risk. Such sites might include (a) areas in excess of 40% slope, (b) areas within deep canyons, (c) areas outside of any SGPA boundary (i.e., not within an Idaho SGPA), (d) areas near human habitation or (e) areas where other factors such as proximity to roads, recreation areas, infrastructure features or other considerations are likely to compromise sage-grouse use.

Step 7 purpose: Model landscape dynamics, vegetation succession or management options.

Step 7. Where vegetation modeling tools and expertise are available, (e.g., LANDFIRE, VDDT-Vegetation Dynamics Development Tool, others), model vegetation changes under different management/treatment scenarios to identify optimal treatment approaches and identify risks.

Table 5-3: General characteristics of sagebrush rangeland needed for productive (suitable) sage-grouse breeding habitat[4]

Habitat features	Habitat indicators	Recommended habitat characteristics	
		Arid sites [c]	Mesic sites[c]
Protective cover	Sagebrush canopy cover	15-25%	15-25%
	Sagebrush height	12-31" (30-80 cm)	16-31" (40-80 cm)
	Sagebrush growth form [a]	Spreading	Spreading
	Perennial grass/forb heights	>7" (>18 cm)	>7" (>18 cm)
	Perennial grass canopy cover	Not specified	≥15%
Protective cover and food	Forb canopy cover	Not specified	≥10%
	Total Grass/forb cover	>=15%	>=25%
Food	Forb availability	Good abundance & availability relative to ecological site potential	Good abundance & availability relative to ecological site potential
Area [b]		>80%	[b]

5.3.2.2.2 Late brood-rearing habitat

Numerous moist or mesic vegetation communities provide late-brood-rearing habitat (Table 5-4). In most areas of Idaho, these habitats are not thought to be limiting for sage-grouse (J. Connelly personal communication 10/2004). However, the distribution of these sites is important, and may change over time due to losses or deterioration as a result of climate change, or development of agriculture, irrigation or hydropower/water sources. Sage-grouse generally will move to higher elevations or

[4] Modified from Connelly et al. 2000*b*.

[a] Sagebrush plants that are more tree or columnar-shaped do not provide the protective cover of sagebrush with a spreading shape. Sagebrush communities with the more columnar shape would require more herbaceous cover to provide good protection for nesting sage-grouse and young broods.

[b] Percentage of seasonal habitat needed with indicated conditions. Connelly et al. 2000b also suggest >80% for mesic areas, but some SAC members believe additional research is needed.

[c] Mesic and arid sites should be defined on a local basis, depending on annual precipitation, herbaceous understory and soil conditions (Tisdale and Hironaka 1981 and Hironaka et al. 1983 cited in Connelly et al. 2000*b*). As a starting point, sites with less than or equal to 12 inches average annual precipitation should be considered arid; and sites greater than 12 inches as mesic.

to wet areas as summer progresses (Schroeder et al. 1999). For some areas, this elevational movement can be fairly dramatic (Connelly et al. 1988, Connelly et al. 2000*b*). For other areas where nesting is occurring at higher elevations or near wet meadow complexes, this movement may be rather limited (Connelly et al. 1988).

Mapping procedure: It is important to delineate those brood-rearing areas that are potentially significant, at the fine-scale. The characteristics presented in Table 5-4 provide general guidelines for productive late brood-rearing habitat.

Several information sources could be helpful for delineating these areas at this scale:

- Observations by local residents, biologists or Local Working Groups
- Historic observation records available in BLM, USFS or state agency files
- National Wetland Inventory (NWI) maps
- Riparian Proper Functioning Condition assessments and maps
- Aerial photography (particularly color infra-red)
- Query for appropriate mesic upland and forb-rich vegetation covertypes, using the 2005 USGS Shrubmap regional landcover dataset (see SAGEMAP website, http://sagemap.wr.usgs.gov/).

Table 5-4: General characteristics of sagebrush rangeland needed for productive late brood-rearing habitat [5]

Habitat features	Habitat indicators	Recommended habitat characteristics [a]	
		Upland sagebrush communities	Riparian and wet meadow communities
Protective cover	Sagebrush canopy cover	10-25%	N/A
	Sagebrush height	16-31" (40-80 cm)	N/A
	Sagebrush proximity		Protective sagebrush cover as described above, under habitat indicators, is within 300 m of riparian or wet meadow feeding area
Protective cover and food	Grass/forb canopy cover	>15%	N/A
Food	Forb availability	Succulent forbs are available during the summer. Generally applies to higher elevations, such as mountain big sagebrush sites.	Riparian and wet meadow conditions are such that succulent forbs are available during the summer

5.3.2.3 Winter habitat

Sagebrush must be exposed above the snow to be available for sage-grouse use, and this situation is most commonly provided at lower-elevation sagebrush areas and on wind-swept ridges. It is important at this scale to identify and map these traditional use areas, particularly those that are crucial habitat for large numbers of birds.

Mapping procedure: Focus on identifying and mapping known sage-grouse winter-use areas based on local knowledge, winter surveys or observations by LWG members, landowners, biologists or others. In the absence of local information, the use of GIS and appropriate spatial data, such as the 2005 USGS Shrubmap regional landcover dataset (http://sagemap.wr.usgs.gov/), may be of help in initially identifying potential wintering areas based on sagebrush cover. However, due to potential local or seasonal variations in weather patterns, snow depth, topography,

[5] Adopted from Connelly et al. *2000b*.

[a] In areas where agricultural fields provide the food resources, the habitat indicators for protective cover also apply.

aspect and the migratory status of the sage-grouse population, on-the ground verification of sage-grouse use of these areas should be completed, especially during winters of above average snow. Determining sage-grouse use during years of above average snow will identify critical wintering areas.

Table 5-5: Characteristics of sagebrush rangeland needed for productive sage-grouse winter habitat [6]

Habitat features	Habitat indicators	Recommended habitat characteristics
Protective cover and food	Sagebrush canopy cover	10-30% exposed above the snow
	Sagebrush height	10-14" (25-35 cm) exposed above the snow

5.3.2.4 Mapping and monitoring of seasonal habitats

The location and status of breeding and winter habitats across Idaho is not well documented. The mapping and evaluation of these habitats will help facilitate conservation planning at the LWG and finer scale.

- Task 1. The IDFG Regions, in cooperation with land-management agency biologists, and LWGs, will delineate all known sage-grouse breeding and winter habitats at 1:100,000 (or 1:24,000 if possible) by December 31, 2007, using the best available information. Areas providing particularly important late-brood rearing habitat (e.g., certain meadows or riparian areas; agricultural-shrubsteppe interfaces where brood use has been documented), should also be delineated. Spatial and tabular data will be maintained and archived by the IDFG. The IDFG Regions will coordinate closely with land-management agencies SAC TAT, and LWGs, as appropriate. The purpose of this mapping effort is to provide a tool to help LWGs and land management agencies in identifying and prioritizing areas for more detailed habitat evaluations or monitoring, fire management planning, and/or restoration efforts.

5.3.2.5 Monitoring selected geographic areas

In the future, certain important areas may warrant more detailed, long-term monitoring. For instance, it may be useful to collect information to address the need for statistically valid rangewide monitoring population and habitat trends, or to research effects of habitat fragmentation, etc. in key areas in Idaho. Such areas may include: (1) Areas of particular interest or concern to LWGs, (2) Habitats closely associated with one or more sage-grouse lek routes of interest, (3) One or more

[6] Adopted from Connelly et al. 2000*b*.

priority SGPAs as identified by the SAC, or (4) Certain unique areas of particular local or regional importance.

- *Task 1.* The concept described above will be evaluated by IDFG Research Biologists and LWGs, as appropriate, by December 31, 2006, with at least partial implementation anticipated during 2007. Sampling methodologies and analytical approaches will be designed in collaboration with a qualified statistician, and in general will likely incorporate stratified random sampling with permanent plots.

5.3.3 Mapping and monitoring projects and infrastructure

The careful documentation of vegetation management and restoration projects, wildfires, infrastructure and other factors affecting sage-grouse habitat is vitally important. Specifically, this information will serve as the foundation for updates to the Idaho Sage-grouse Habitat Planning map, and for tracking progress toward the elimination, reduction or mitigation of threats locally and at broader scales.

- *Task 1.* SAC-TAT and IDFG will coordinate with appropriate agency contacts (e.g. BLM, FS, IDFG, IDL, NRCS) and LWGs to update the statewide sage-grouse habitat planning map annually.
    - The annual statewide map update will be completed and made available by approximately March 1 of each year.

- *Task 2.* The SAC-TAT will coordinate with IDFG to acquire spatial data relative to new infrastructure features (e.g., paved state, federal, interstate roads, major power lines, wind energy development sites, communications towers, oil/gas pipelines, geothermal sites, etc.) as needed.

- *Task 3*. LWGs are encouraged to utilize the baseline infrastructure maps and metrics provided in the Plan to aid in prioritizing threats locally, in the short term. In the longer term, it is recommended that LWGs collaborate with agencies, rural utility companies and other entities or partners in mapping and quantifying infrastructure features not available in the Plan, such as local power distribution lines, minor roads (e.g., gravel, county, 2-track, OHV trails, etc.), or other features to establish a more refined baseline.

5.3.4 Data dissemination and archiving

5.3.4.1 Archiving

The data described above (Sections 5.3.1 through 5.3.3) will be permanently archived, and updated annually, by IDFG.

5.3.4.2 Dissemination

The data described above are generally intended for use by agency specialists, LWGs, or NGO partners, in conservation planning for sage-grouse. However, the data are considered Category 1 public data, and will be made available to the public via the Idaho FGDC Geospatial One Stop Clearinghouse node at the University of Idaho, USGS Sagemap website, and the Department of Interior Geography Network. Private lands information will only be available as public information when individual landowners voluntarily provide information.

5.4 Adaptive management

The utility of this Plan in achieving its stated objectives is largely contingent on the implementation of the various conservation measures in the appropriate place and time, and their subsequent effectiveness. While measures may be implemented with the best of intentions, the success of certain measures is not guaranteed. For example, a restoration seeding may fail, or prove only marginally successful, due to unforeseen influences such as drought, wildfire, rangeland grasshopper outbreaks, or human error. Moreover, some conservation measures may involve habitat restoration actions that will take well over a decade to accomplish.

Given the multitude of temporal and spatial variables, in many cases, determining the specific effects of individual conservation actions on sage-grouse populations will be very difficult. However, over time the knowledge gained by trying to assess the effectiveness of various actions will contribute new knowledge about sage-grouse populations and about the utility of conservation actions.

Adaptive management is a method for examining alternative strategies for meeting measurable biological goals and objectives, and then, if necessary, adjusting future conservation management actions according to what is learned. As knowledge about Idaho sage-grouse populations increases, and as a better understanding of the effectiveness of various conservation measures (at both local and regional scales) is

gained, it will be possible and desirable to review the effectiveness of various actions and adapt those responses where it is deemed appropriate.

The degree to which conservation measures (or strategies) meet their stated objectives can only be determined by monitoring. It is thus the intent of this Plan to ensure that: (1) the implementation of conservation measures be documented by the appropriate agency or landowner, (2) the success or effectiveness of conservation measures be monitored periodically using the most appropriate method, and (3) information exchange occurs between parties to the Plan to facilitate the learning from our various management actions. Suggested processes and mechanisms for documentation and information transfer necessary to implement adaptive management are identified in Table 5-6.

Table 5-6 Process and documentation necessary to implement adaptive management

Action	Responsible Party	Method of Documentation
Implementation of conservation measure	Agency project team leader or landowner	1. Project Completion Report in project file, with "as-built" illustrations, details as appropriate; upward reporting of spatial and tabular data; include in annual LWG report to the SAC.
Measure effectiveness of conservation measure	Agency project team leader or landowner	1. Standardized protocol (e.g., vegetation transect); photographs; narrative write-up. Results placed in permanent project file. Results incorporated into annual LWG report to SAC.
Information transfer	Agency specialists, landowners, LWGs, Research Biologists, and Ecologists	1. Annual reports to the SAC and coordination with SAC TAT. 2. Presentations at professional meetings (e.g., Idaho Chapter Wildlife Society, Society for Range Management, etc.) 3. Publication in peer-reviewed scientific publications or other appropriate venues.